(12) UK Patent Application (19) GB (11) 2 369 794 (13) A

(43) Date of A Publication 12.06.2002

(21) Application No 0029717.6

(22) Date of Filing 06.12.2000

(71) Applicant(s)
Shih-Kuei Hsieh
367-1 Pei Yang Road, Feng Yuan City, Taichung Hsien, Taiwan

(72) Inventor(s)
Shih-Kuei Hsieh

(74) Agent and/or Address for Service
Baron & Warren
18 South End, Kensington, LONDON, W8 5BU, United Kingdom

(51) INT CL^7
B25B 7/18

(52) UK CL (Edition T)
B4W W5CX W5C2 W5X1

(56) Documents Cited
GB 2191438 A
EP 0242198 A2
US 2483383 A

(58) Field of Search
UK CL (Edition S) B4W W5CX W5C2 W5X1
INT CL^7 B25B 7/12 7/14 7/16 7/18 27/20
Online :WPI, EPODOC, PAJ

(54) Abstract Title
Pliers for use in a narrow space.

(57) Pliers for use in a narrow space, including: a pair of neck sections 22,22' which are pivotally connected with each other by a shaft rod 24 and can be opened and closed; a pair of jaw sections 26,26' located on one end of the neck sections to define a pliers mouth; and two grips 28,30 disposed at the other ends of the neck sections for a user's hands to hold and control the jaw sections to open or close. At least one of the grips 28 is pivotally connected with a corresponding neck section, whereby the grip can be rotated about the pivot section and converted into different operation aspects and adapted to different operation sites.

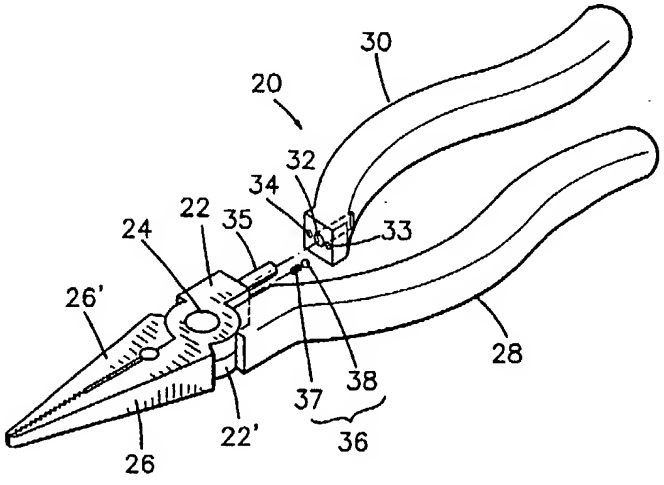

FIG.5

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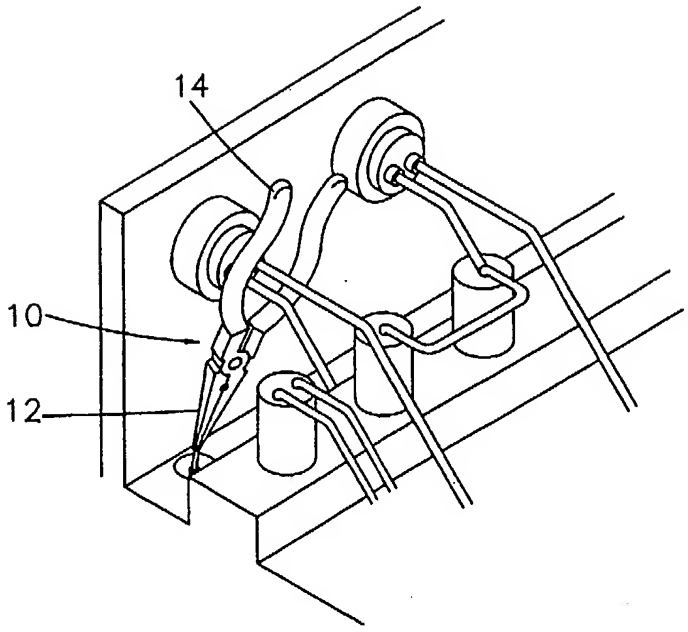


FIG. 1
PRIOR ART

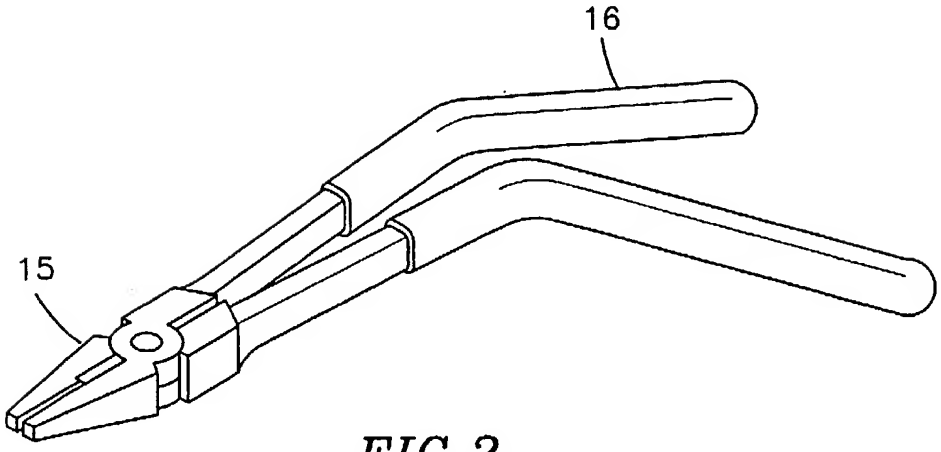


FIG. 2
PRIOR ART

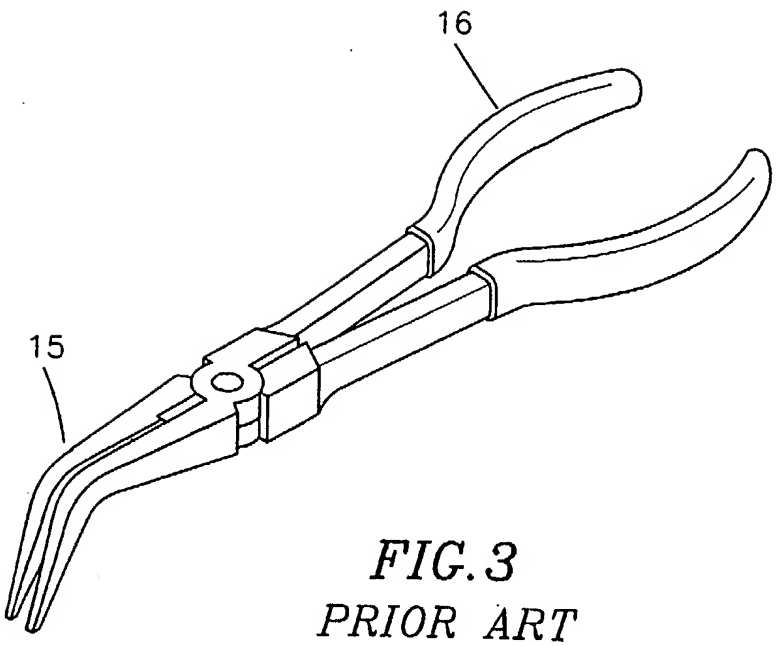


FIG. 3
PRIOR ART

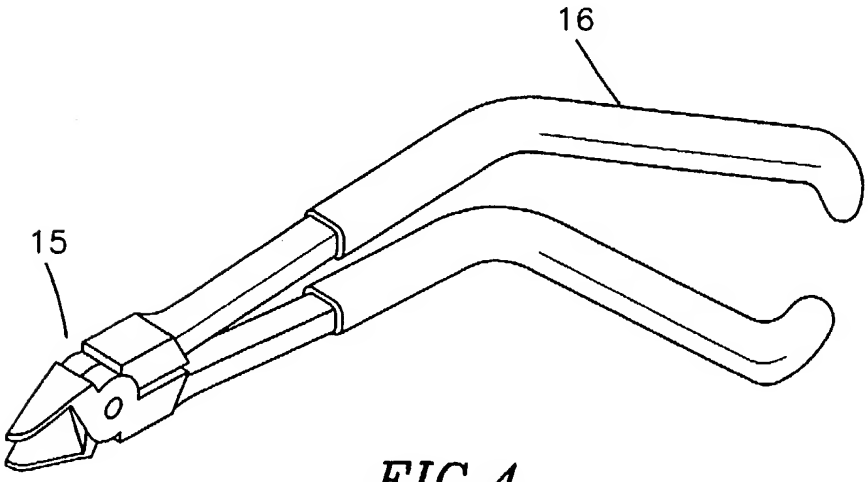


FIG. 4
PRIOR ART

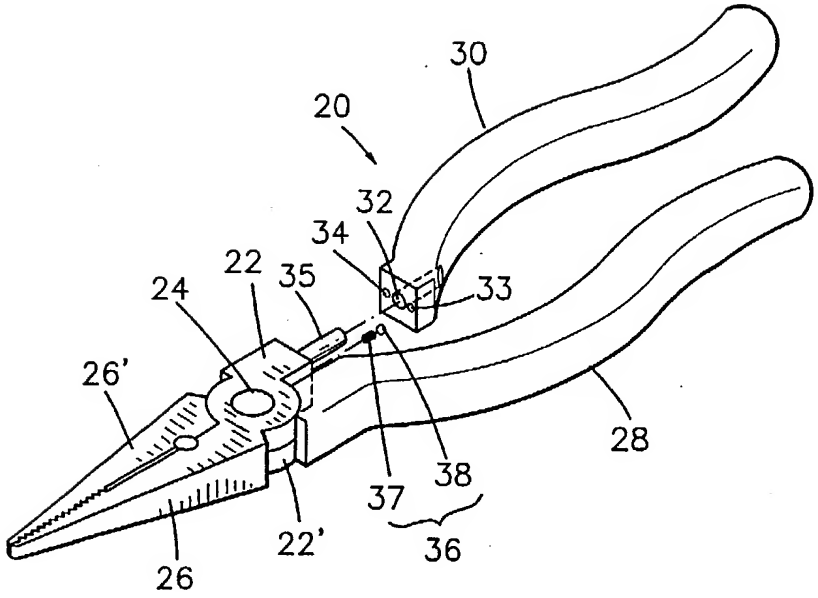

30
20
32
34
22
35
24
33
26'
28
38
37
36
22'
26

FIG. 5

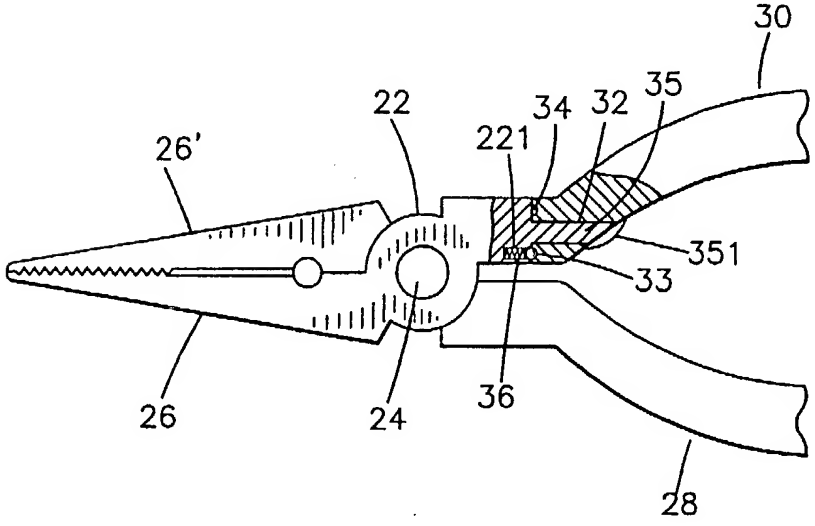

30
22
34
32
35
221
26'
351
33
26
24
36
28

FIG. 6

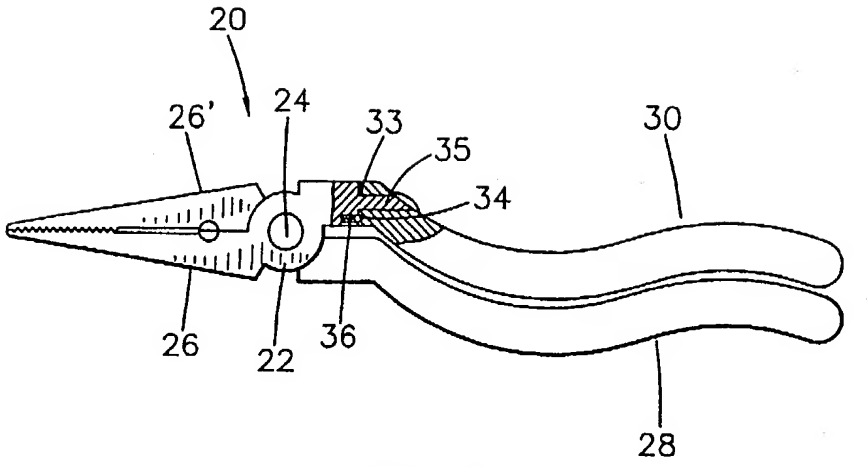


FIG. 7

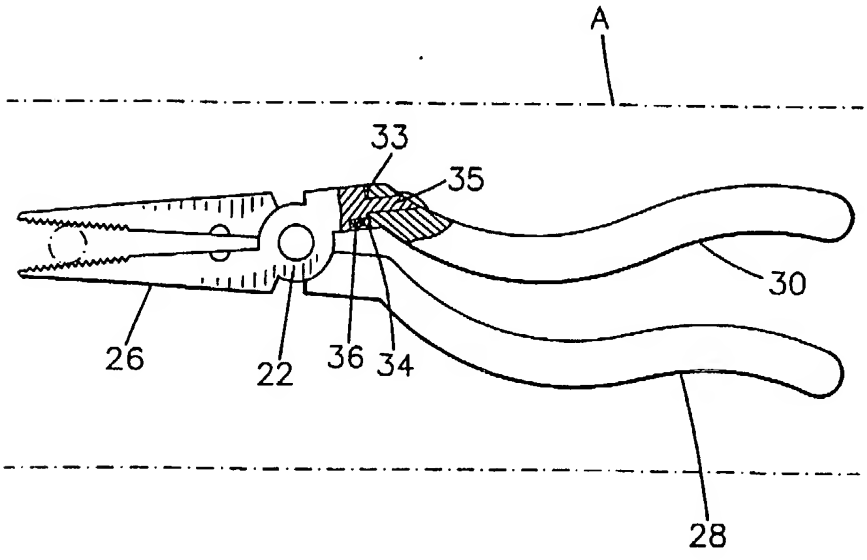


FIG. 8

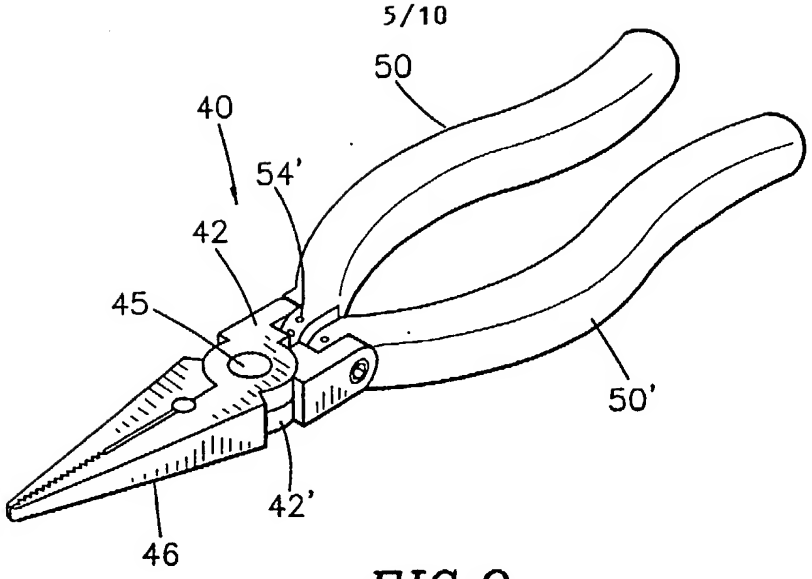


FIG. 9

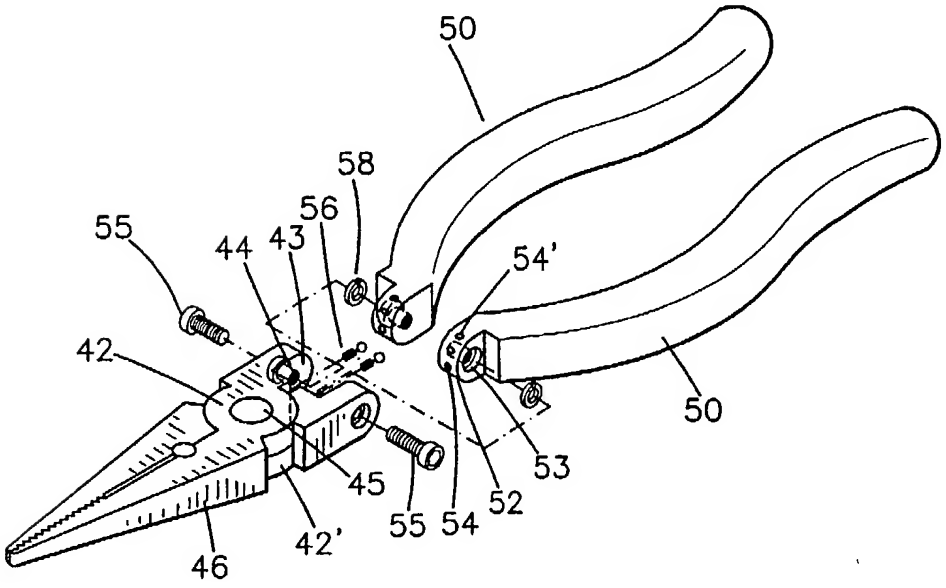


FIG. 10

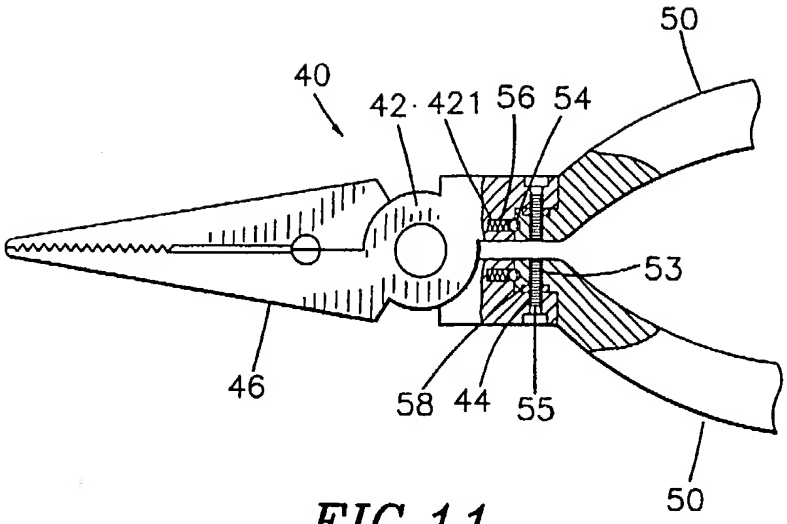


FIG. 11

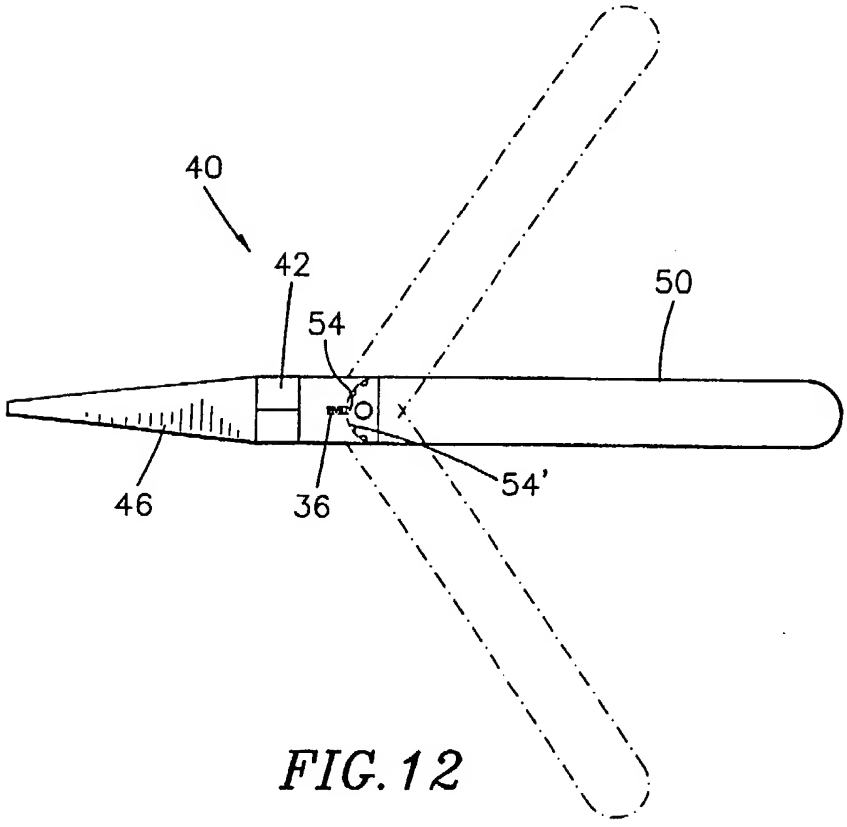


FIG. 12

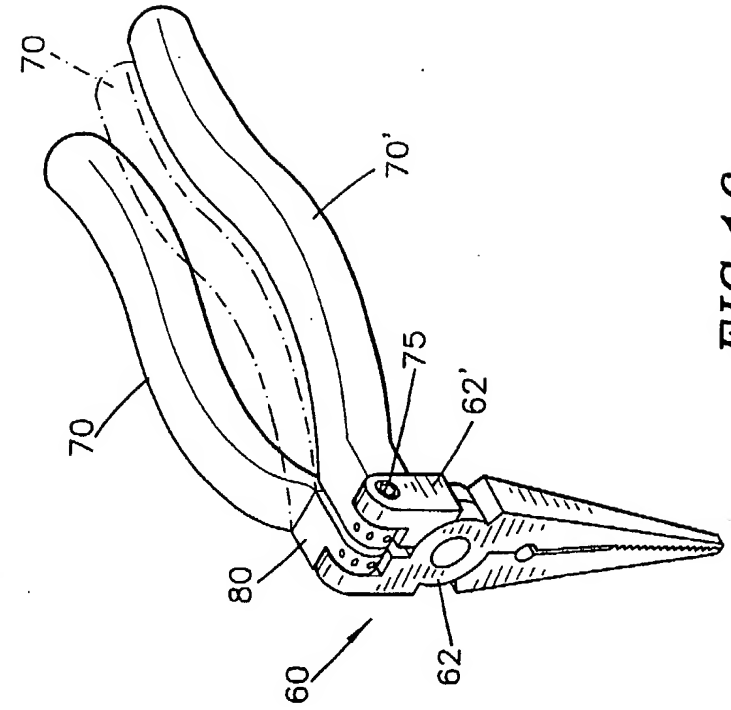


FIG. 16

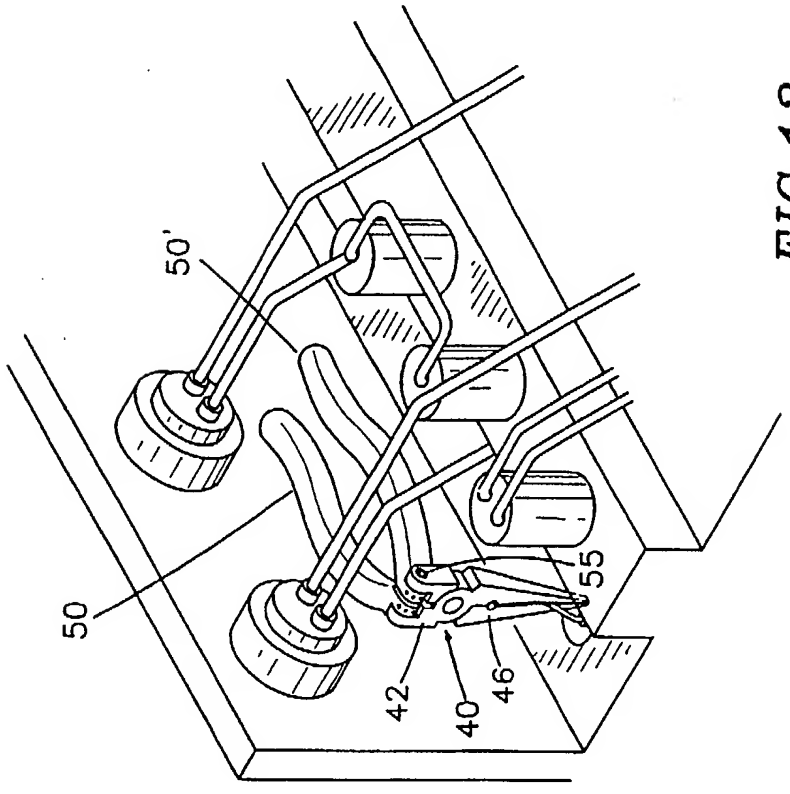


FIG. 13

FIG. 14

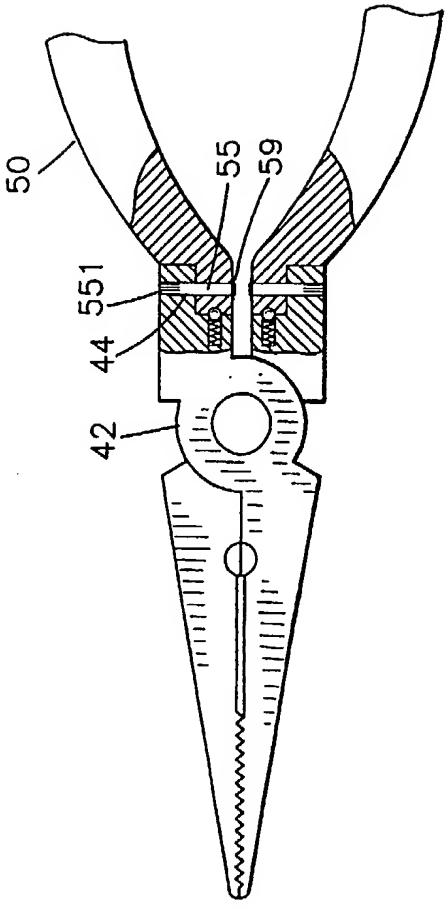
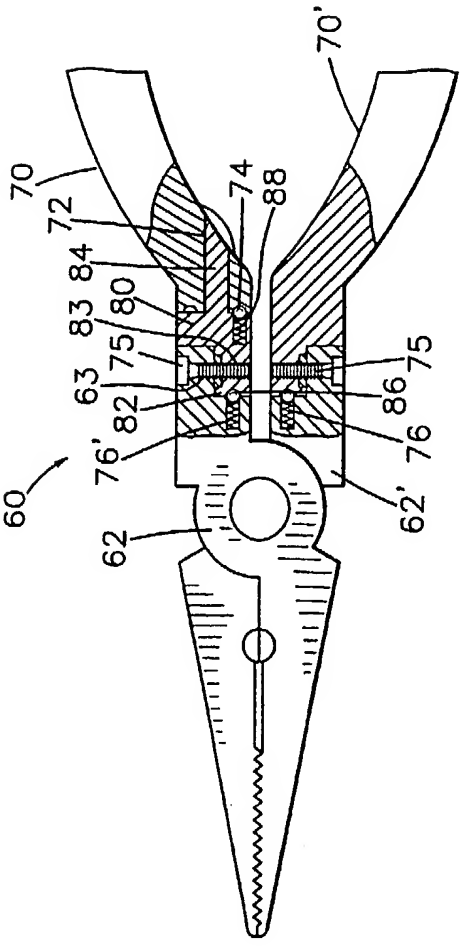


FIG. 15



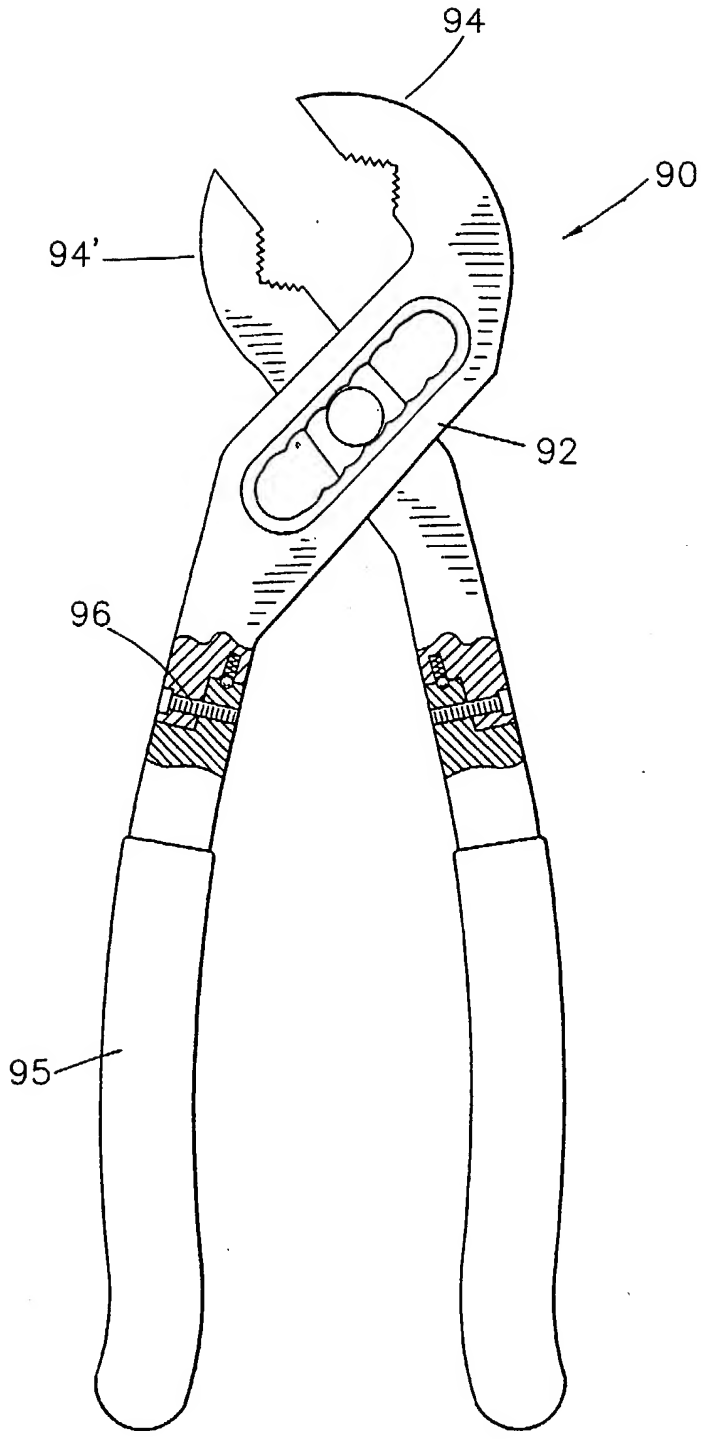


FIG. 17

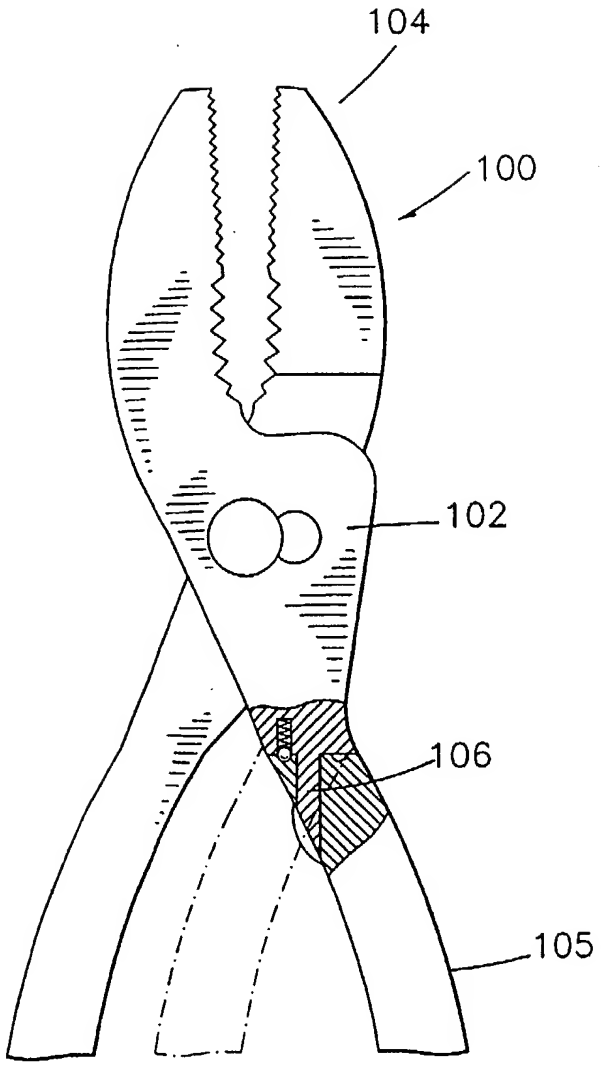


FIG. 18

PLIERS FOR USE IN NARROW SPACE

BACKGROUND OF THE INVENTION

The present invention relates to a hand tool, and more particularly to a pliers which can be converted into different operation aspects in accordance with different working sites. Therefore, the pliers can be used in various narrow spaces.

Fig. 1 shows a conventional pliers 10 including a pliers mouth 12 and two grips 14. A user can hold the grips to control the pliers mouth to open or close for clamping a work piece. The pliers mouth 12 and the grips 14 are co-linearly arranged. When operating such pliers, the user must bend his/her wrist and is subject to so-called carpal tunnel syndrome. Moreover, such pliers can be hardly used in a narrow space.

Recently, an improved pliers has been developed as shown by Figs. 2 to 4. Such pliers has a pliers mouth 15 not coaxial with the grips 16. In operation, the user's wrist and the forearm are co-linear to meet human body configuration. Also, such pliers can be used in a narrow space.

However, the pliers mouth 15 and the grips 16 are kept in a fixed angle so that the pliers can be only used in a specific site and can be hardly adapted to various narrow spaces.

SUMMARY OF THE INVENTION

It is therefore a primary object of the present invention to provide a pliers which can be converted into different operation aspects in accordance with different working sites. Therefore, the pliers can be used in various narrow spaces.

The present invention can be best understood through the following description and accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the structure and operation of a conventional pliers;

Fig. 2 shows the structure of another type of conventional pliers;

Fig. 3 shows the structure of still another type of conventional pliers;

Fig. 4 shows the structure of still another type of conventional pliers;

Fig. 5 is a perspective partially exploded view of a preferred embodiment of the present invention;

Fig. 6 is a partially sectional assembled view of the embodiment of Fig. 5;

Fig. 7 is a view according to Fig. 6, showing that the grip is turned;

Fig. 8 is a view according to Fig. 7, showing the use of the

pliers;

Fig. 9 is a perspective of another embodiment of the present invention;

Fig. 10 is a perspective partially exploded view of the embodiment of Fig. 9;

Fig. 11 is a partially sectional view of the embodiment of Fig. 9;

Fig. 12 is a side view of the embodiment of Fig. 9;

Fig. 13 shows that the pliers of Fig. 9 is used with the grips turned by an angle;

Fig. 14 is a partially sectional view of still another embodiment of the present invention;

Fig. 15 is a partially sectional view of still another embodiment of the present invention;

Fig. 16 shows that the pliers of Fig. 15 is converted into another using aspect;

Fig. 17 is a partially sectional view of still another embodiment of the present invention; and

Fig. 18 is a partially sectional view of still another embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Please refer to Figs. 5 and 6. The pliers 20 of the present invention includes:

a pair of neck sections 22, 22′ overlapping each other and

pivotally connected with each other by a shaft rod 24, whereby the neck sections 22, 22′ can be opened and closed about the shaft rod 24;

a pair of jaw sections 26, 26′ which can be claws for clamping a work piece or blades for cutting a work piece, the jaw sections 26, 26′ outward oppositely extending from one end of the neck sections 22, 22′ in the same direction to define a pliers mouth; two grips 28, 30 which are arched bars respectively connected with the other ends of the neck sections 22, 22′ for a user to hold, the grip 28 being directly integrally formed with the neck section 22′, while the grip 30 being separately manufactured and connected with the neck section 22.

a pivot shaft 35 outward extending from the other end of the neck section 22.

One end of the grip 30 is formed with an inward extending shaft hole 32 in which the pivot shaft 35 is fitted as shown in Fig. 6. The grip 30 is rotatable about the pivot shaft 35. The free end of the pivot shaft 35 is riveted to form a bulge section 351 and fixed with a certain member preventing the grip 30 from detaching.

a resilient pressing member 36 including a spring 37 and a ball body 38 embedded in a dent 221 of the neck section 22 to resiliently press a locating section 33 of the pivot end of the grip 30 for locating the grip 30.

In this embodiment, the pivot shaft 35 is parallel to the longitudinal direction of the pliers.

It should be noted that the shaft hole 32, pivot shaft 35 and resilient pressing member 36 can be exchangeably disposed in the neck section 22 and the grip 30 and are not limited to what shown by the figures.

When the locating section 33 of the grip 30 is pressed and located by the resilient pressing member 36 as shown in Fig. 6, the grips 30, 28 are mirror symmetrical to each other about the longitudinal direction of the pliers and can be used as a conventional pliers.

Referring to Fig. 7, the grip 30 can be turned to attach to the other grip 28 with the pressing member 36 pressing the other locating section 34. At this time, the volume occupied by the two grips is reduced and the pliers 20 can be easily used in a narrow space A as shown in Fig. 8.

Figs. 9 and 10 show another embodiment of the pliers 40 of the present invention, including a pair of neck sections 42, 42′ pivotally connected with each other by a shaft rod 45, a pair of jaw sections 46 and two grips 50, 50′. The grips 50, 50′ are separately manufactured and pivotally connected with the neck sections 42. The neck sections 42 are pivotally connected with the grips 50 by the same measure. Therefore, one of the grips will be

exemplified herein.

The free end of the neck section 42 is formed with a lug 43 having a transverse pivot thread hole 44. One end of the grip 50 is formed with an arch projection 52 having a pivot hole 53. A pivot shaft 55 which is a bolt is screwed into the pivot holes 44, 53 to pivotally connect the grip with the neck section about the pivot shaft 55. A resilient pressing member 56 is embedded in a dent 421 of the neck section 42 as shown in Fig. 11 to resiliently press a locating section 54 of the projection 52 of the grip 50 so as to locate the grip. In addition, a soft ring member or resilient washer 58 is embedded between the attaching faces of the lug 43 and the projection 52 to resiliently press the pivot sections of the neck section and the grip and prevent the pivot shaft 55 from detaching.

In this embodiment, the pivot shaft 55 is normal to the longitudinal direction of the pliers.

Similarly, the pressing member 56 and the locating section 54 can be exchangeably disposed in the neck section 42 and the grip 50.

In use, when the pressing member 56 is pressed against and located in one locating section 54 of the grip 50 as shown in Fig. 12, the longitudinal direction of the grips 50 is parallel to the longitudinal direction of the neck section 42. When the grips are rotated to press the pressing member 56 against the other locating

section 54′, the longitudinal direction of the grips 50 and the longitudinal direction of the neck section 42 contain a predetermined angle as shown in Fig. 13. Under such circumstance, the pliers can be used in a narrow space.

Fig. 14 shows still another embodiment of the present invention, which is substantially identical to the embodiment of Fig. 9. The same components are denoted by the same numerals. The pivot shaft 55 used to pivotally connect the grip 50 with the neck section 42 is a shaft pin. One end of the pivot shaft 55 has an embossed circumference 551 engaged in the pivot hole 44 of the neck section 42 without detachment. The other end of the pivot shaft 55 is passed through the grip 50 and fixedly clamped by a fixing member such as a C-shaped clip 59 so as to prevent the grip from detaching.

Fig. 15 shows still another embodiment of the pliers 60 of the present invention, in which the two grips 70, 70′ are separately manufactured. The grip 70′ is pivotally connected with the free end of a neck section 62′ by a transverse first pivot shaft 75 and pressed and located by a resilient pressing member 76.

This embodiment includes an intermediate member 80. One end of the intermediate member 80 is formed with a flange 82, while the other end thereof is formed with a second pivot shaft 84. The flange of the intermediate member 80 is formed with a pivot hole 83. Another first pivot shaft 75 is passed through the pivot hole 83 and the pivot hole 63 of the neck section 62 to pivotally connect the

intermediate member 80 and the neck section 62. The intermediate member is formed with several locating sections 86 pressed and located by another pressing member 76′. The second pivot shaft 84 is passed through the shaft hole 72 of the grip 70 so that the grip 70 is rotatable about the second pivot shaft 84. A second pressing member 88 is embedded in the body of the intermediate member 80 to resiliently press one of the locating sections 74 of the grip 70 and locate the grip.

In use of this embodiment, the grip 70′, the grip 70 and the intermediate member 80 are rotatable about the two first pivot shafts 75 as shown in Fig. 16. The grip 70 is also turnable about the second pivot shaft 84 to attach to the grip 70′ as shown by the phantom line.

Accordingly, the first pivot shaft 75 of this embodiment is normal to the longitudinal direction of the pliers, while the second pivot shaft 84 is parallel to the longitudinal direction of the pliers. Therefore, the grip can be rotated and turned and the pliers can be versatilely used. The pliers of the present invention can be converted into different operation states and adapted to various kinds of narrow spaces and human body configuration.

Fig. 17 shows still another embodiment of the pliers 90 of the present invention, the distance between the two jaw sections 94, 94′ of the pliers is adjustable, the neck section 92 is pivotally connected with the grip 95 by a transverse pivot shaft 96.

Fig. 18 shows still another embodiment of the pliers 100 of the present invention, the distance between the two jaw sections 104 of the pliers can also be adjusted, at least one neck section 102 is pivotally connected with a grip 105 by a longitudinal pivot shaft 106.

CLAIMS

1. Pliers for use in a narrow space, comprising:

a pair of neck sections overlapping each other and pivotally connected with each other by a shaft rod, whereby the neck sections can be opened and closed;

a pair of jaw sections located oppositely on one end of the neck sections in the same direction to define a pliers mouth;

two grips disposed at the other ends of the neck sections for a user's hands to hold and control the jaw sections to open or close, said pliers being characterized in that one end of at least one of the grips is pivotally connected with one end of a corresponding neck section, whereby the grip can be rotated and converted into different operation pattern.

2. Pliers as claimed in claim 1, wherein the grip can be rotated about an axis parallel to a longitudinal direction of the pliers.

3. Pliers as claimed in claim 1, wherein each of the grips can be rotated about an axis normal to a longitudinal direction of the pliers.

4. Pliers as claimed in claim 1, wherein the grip and the neck section is pivotally connected with each other by a pivot shaft,

the pivot shaft having an axis parallel to a longitudinal direction of the pliers, whereby the grip can be turned to attach to the other grip or be mirror symmetrically to the other grip.

5. Pliers as claimed in claim 1, wherein each of the two grips is pivotally connected with one of the neck sections by a pivot shaft, the pivot shaft having an axis normal to a longitudinal direction of the pliers, whereby the grips can be rotated to change a longitudinal angle contained by the grips and the neck sections.

6. Pliers as claimed in claim 1, further comprising a resilient pressing member disposed between the pivot sections of the grip and the neck section for resiliently locating the grip.

7. Pliers as claimed in claim 4, wherein one end of the pivot shaft is fixedly connected with a free end of the neck section and the pivot end of the grip is formed with a shaft hole in which the pivot shaft is fitted.

8. Pliers as claimed in claim 4, wherein one end of the pivot shaft is fixedly connected with the pivot end of the grip and the free end of the neck section is formed with a shaft hole in which the pivot shaft is fitted.

9. Pliers as claimed in claim 5, wherein the pivot end of the neck section is formed with a transverse pivot hole, the pivot shaft being transversely fixedly disposed at the pivot end of the grip

and fitted in the pivot hole.

10. Pliers as claimed in claim 5, wherein the pivot end of the grip is formed with a transverse pivot hole, the pivot shaft being transversely fixedly disposed at the pivot end of the neck section and fitted in the pivot hole.

11. Pliers as claimed in claim 5, wherein each of the pivot ends of the neck section and the grip is formed with a transverse pivot hole, the pivot shaft being pivotally fitted in the pivot hole.

12. Pliers as claimed in claim 1, further comprising an intermediate member, wherein one end of a first grip is pivotally connected with one end of a neck section by a first pivot shaft, one end of the intermediate member being pivotally connected with one end of the other neck section by another first pivot shaft, the two first pivot shafts having axes normal to the longitudinal direction of the pliers, one end of a second grip being pivotally connected with the other end of the intermediate member by a second pivot shaft, the second pivot shaft having an axis parallel to the longitudinal direction of the pliers.

13. Pliers as claimed in claim 12, further comprising two first resilient pressing members respectively disposed between the first grip and the neck section and between the intermediate member and the other neck section so as to resiliently locate the first grip and the intermediate member, the pliers further

comprising a second resilient pressing member disposed between the intermediate member and the second grip to resiliently locate the second grip.

14. Pliers as claimed in claim 12, wherein the second pivot shaft is disposed at one end of the second grip, the intermediate member being formed with a pivot hole for pivotally connecting with the second pivot shaft.

15. Pliers as claimed in claim 12, wherein the second pivot shaft is disposed at one end of the intermediate member, the end of the second grip being formed with a pivot hole for pivotally connecting with the second pivot shaft.

16. Pliers as claimed in claim 5, wherein the pivot end of each neck section is formed with a lug and the pivot end of each grip is formed with a projection, the lug being pivotally connected with the projection by the pivot shaft.

17. Pliers as claimed in claim 16, further comprising a resilient member disposed between the lug and the projection.

18. Pliers for use in a narrow space substantially as hereinbefore described with reference to Figs 5 to 18 of the accompanying drawings.

Application No: GB 0029717.6 **Examiner:** David Harness
Claims searched: 1-18 **Date of search:** 31 May 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): B4W (W5C2, W5CX, W5X1)

Int Cl (Ed.7): B25B 7/12, 7/14, 7/16, 7/18, 27/20

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2191438 A	(GUSTAVSSON) see figures 1 & 2.	1,2,4,6,7 & 8
X	EP0242198 A2	(LETHERMAN) See figure 1.	1,3,5
A	US2483383	(HEIMANN ET AL) See figures 4 and 5.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.